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# Osage-Orange

(*Maclura pomifera*)

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Osage-orange is a small tree that grows rather rapidly. Its natural range is confined to a limited area centering about the junction of Texas, Oklahoma, and Arkansas, but it has been widely planted for hedges throughout the United States. The trees are generally crooked and limby, and it is difficult to secure straight-grained, clear pieces of lumber from them even in short lengths. The wood is exceedingly heavy and ranks very high in strength properties and resistance to decay. It is used principally for fence posts. Osage-orange contains a coloring substance which is occasionally extracted and used for dyeing textiles. Pieces of the wood free from defects are in demand for archery bows. Osage-orange was formerly widely used in the Southwest in the construction of horse-drawn vehicles, especially for wagon-wheel rims, but the supply of material suitable for such use has long since become very scarce.

**Nomenclature.**—Osage-orange is the name commonly used. Other names sometimes used are bois d'arc,<sup>1</sup> bodock,<sup>2</sup> mockorange, bow-wood, wild orange, and hedge.

**Distribution and growth.**—Osage-orange has a short trunk and stout, spreading branches. The trunk is frequently crooked and is also likely to be defective in other ways. The original range of the tree was restricted largely to eastern and southern Texas, southeastern Oklahoma, southern Arkansas, and northern Louisiana (fig. 1). Part of this region was treeless prairie and part was covered with thickets or clumps of trees made up of a mixture of species including Osage-orange. Occasionally under the most favorable conditions Osage-orange formed pure stands of as much as 100 acres in which the larger trees were 50 feet or more in height and 2 feet or more in diameter. Nearly all the better quality timber in the original stands has been cut, and a tree 30 feet in height and 12 to 18 inches in diameter is hard to find.

Since early days Osage-orange has been widely planted throughout the United States, principally for hedges, and is now found in practically every State. Some of these hedges have been abandoned, and the trees have reached cordwood size or better and are potential sources of a limited amount of commercial material.

Osage-orange will grow under a wide range of conditions, as its extensive planting indicates, and will reproduce from both seeds and sprouts. It reaches its best development in the black, fertile soils

<sup>1</sup> So named by the early French explorers because the Osage Indians made bows of it.

<sup>2</sup> A corruption of the French name.

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along the rivers and in the flat lands of its original range. Here it takes about 20 years to grow a post.

**Production.**—Available statistics on products made from Osage-orange wood are fragmentary and of doubtful value. Lumber production data for this species are available in the records of the Bureau of the Census for only 2 years. In 1909 the recorded lumber cut was



FIGURE 1.—Natural range of Osage-orange (*Maclura pomifera*).

340,000 board feet, and in 1911—1,210,000 board feet. An estimate made in 1911<sup>3</sup> placed the total production of Osage-orange for that year at the equivalent of 26,000,000 board feet. The following products and amounts were included:

<sup>3</sup> MAXWELL, H. UTILIZATION OF OSAGE ORANGE. Natl. Impl. and Vehicle Assoc. Farm Wagon Dept. 14 pp. 1911.

	<i>Board feet</i>
Posts-----	18, 400, 000
House blocks-----	1, 000, 000
Bridge piling-----	1, 000, 000
Wagon rims-----	700, 000
Insulator pins-----	400, 000
Telephone poles-----	350, 000
Waste in the manufacture of rims and pins-----	<sup>1</sup> 4, 150, 000

<sup>1</sup> This amount of waste is excessive. Much of it is due to numerous defects in the logs and bolts from which the pins and rims are made. These defects include cavities, often not evident until the bolts are opened up.

With the exception of posts, these products are now produced from Osage-orange only in very small quantities and some not at all. It is believed that a large proportion (probably 75 percent) of the Osage-orange posts now cut annually still come from Texas and nearby States. Some are cut from the hedges that have been so widely planted. Possibly 1,000,000 posts, equivalent roughly to 2,000,000 board feet, are now produced annually. The wood is also used for fuel. A very rough estimate for the average annual cut of Osage-orange for all purposes would be the equivalent of 3,000,000 board feet.

**Supply.**—No estimates of the stand of Osage-orange are available. In 1911, when the total cut in the original growth range was estimated at 26,000,000 board feet, the stand was probably over 200,000,000 board feet in that region. Since then the original stands have been heavily cut, and it is probable that the present stand, including material of post size and up, does not exceed the equivalent of 30,000,000 board feet, of which the greater part is in the region of original growth and some is in widely scattered plantings for hedges.

**Properties.**—The heartwood of Osage-orange is golden yellow to golden brown when freshly cut. It turns darker on exposure to the air. The sapwood is narrow, generally not over one-half inch in width, and light yellow in color. The annual rings are distinct. They are made up of a comparatively dark, thick band of summerwood and a lighter colored, frequently narrower, band of springwood. Osage-orange is exceedingly heavy<sup>4</sup> and ranks very high in bending and compressive strength, hardness, and toughness. In these properties it is considerably above white oak and somewhat above hickory.<sup>5</sup> In stiffness it ranks below hickory and above white oak. It is reported to split easily. The wood has a small shrinkage—much less than would be expected from its weight—and only slightly more than Eastern white pine. The small size and crookedness of the trees make it difficult to secure pieces even a few feet long that are straight-grained and free from defects. The tools used in working the wood require frequent sharpening on account of its hardness. One of the outstanding properties of Osage-orange is its resistance to decay.<sup>6</sup> Fence posts still in use after more than 50 years of service have been reported.

Osage-orange wood contains yellow, green, and brown coloring principles almost identical in quantity and quality with those derived from the wood of the fustic tree of the West Indies and tropical America which has long been used as a limited source of dyestuffs. The

<sup>4</sup> The average weight of Osage-orange in an air-dry condition (12 percent moisture) is approximately 55 pounds per cubic foot.

<sup>5</sup> Average of four commercial species of true hickory.

<sup>6</sup> This applies to the heartwood. The sapwood of all species lacks resistance to decay.



dyeing principles in both of these woods is moric acid (morin) and morintannic acid (maclurin). Osage-orange may be employed as a dyewood in all cases where fustic wood has proved satisfactory.<sup>7</sup>

**Principal uses.**—Osage-orange is used principally for fence posts and to some extent for fuel. It has been planted extensively for hedges and windbreaks. During the horse-drawn vehicle days, Osage-orange was in considerable demand for wheel rims for wagons. For rims to be used on the hot, dry, sandy roads of the Southwest, it was considered the best wood on account of its combination of hardness, strength, small shrinkage and swelling, and durability. Long before wooden wagons were superseded by automobiles, however, the supply of Osage-orange became scarce. Small quantities have always been used in the South for foundation blocks for cheap houses built without cellars, because of the marked durability of the wood.

Formerly the waste from rim mills was used for making insulator pins, but few if any pins are now made from this wood.<sup>8</sup> Osage-orange is one of the preferred bow woods<sup>9</sup> as indicated by one of its names, but only small quantities are used on account of the difficulty of finding straight-grained, clear pieces of sufficient length to make even two-piece bows of the jointed type, to say nothing of single-piece bows requiring 6-foot pieces.

Osage-orange was long used in Texas in a small way as a dyewood. During World War I, when imports of dyes were curtailed, there was considerable expansion in the use of the wood as a source of dyestuffs. After the war, however, because of the development of other sources of dyestuffs and the availability of imports, Osage-orange again became of only minor importance as a dyewood.

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<sup>7</sup> KRESSMAN, F. W. OSAGE-ORANGE—ITS VALUE AS A COMMERCIAL DYESTUFF. Jour. Indust. and Engin. Chem. 6 (6): 462-464. 1914.

<sup>8</sup> Black locust is the principal wood used for insulator pins. Steel pins are being used in place of wooden pins in increasing quantities.

<sup>9</sup> Other preferred bow woods are imported lemonwood, sometimes called degare, which grows in Cuba, southern Mexico, Central America, and northern South America; and Pacific yew, usually called simply yew, which grows in the United States and Canada in the mountain forests of the Pacific coast.